New York State Environmental Public Health Tracking System: Features and Functions

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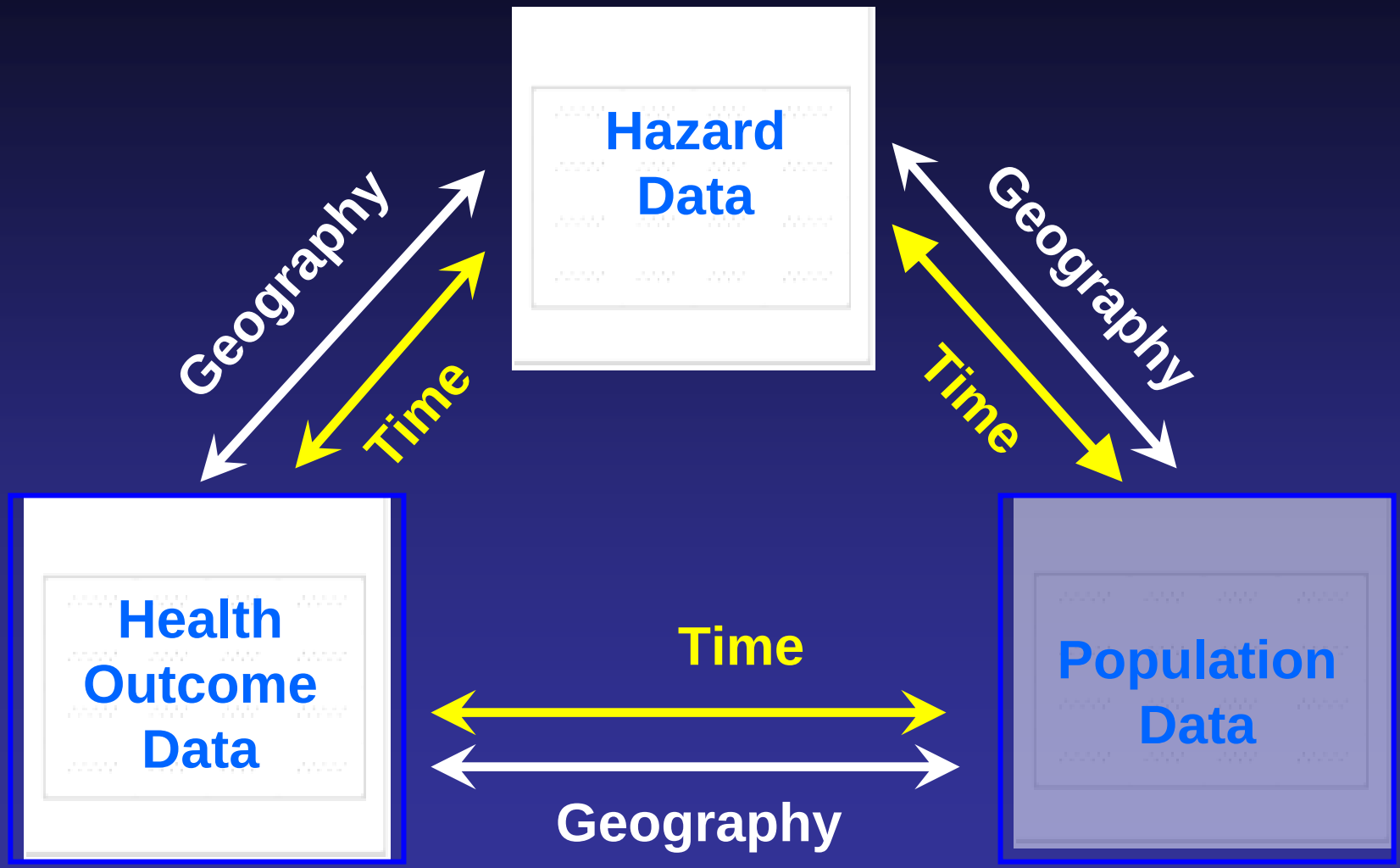
What is surveillance?

Systematic ongoing collection and analysis of data and the timely dissemination of information to those who need to know so that action can be taken.

Demonstrate a surveillance system Provides “One-stop shopping”

- Access to data
- Data linking and integration
- Analysis

Surveillance System Framework



Health Data

- Hospitalizations (SPARCS)
  - Asthma
  - Cardiovascular disease
- Mortality (death certificates)
  - Cardiovascular disease
- Birth outcomes
  - Birth weight & prematurity (birth certificates)
  - Birth Defects (Congenital Malformations Registry)
- Geographic scale of the health data
  - ZIP Code
  - Residential address
  - Exposure Regions

Environmental Hazard Data
Air Pollution

- Monitoring data (DEC)
  - Ozone
  - Particulate matter
- Modeled data
  - Meteorological models using emissions data (EPA)
  - Interpolated data (NYSDOH, EPA)
- Geographic level of air pollution data
  - Grid cells
  - Nearest monitoring station
  - ZIP Code

Geocoding

- Use enhanced street files
  - NY Accident Incident Location Information System (ALIS)
- Real Property Centroids
- MapMarker Software

Ungeocoded Records

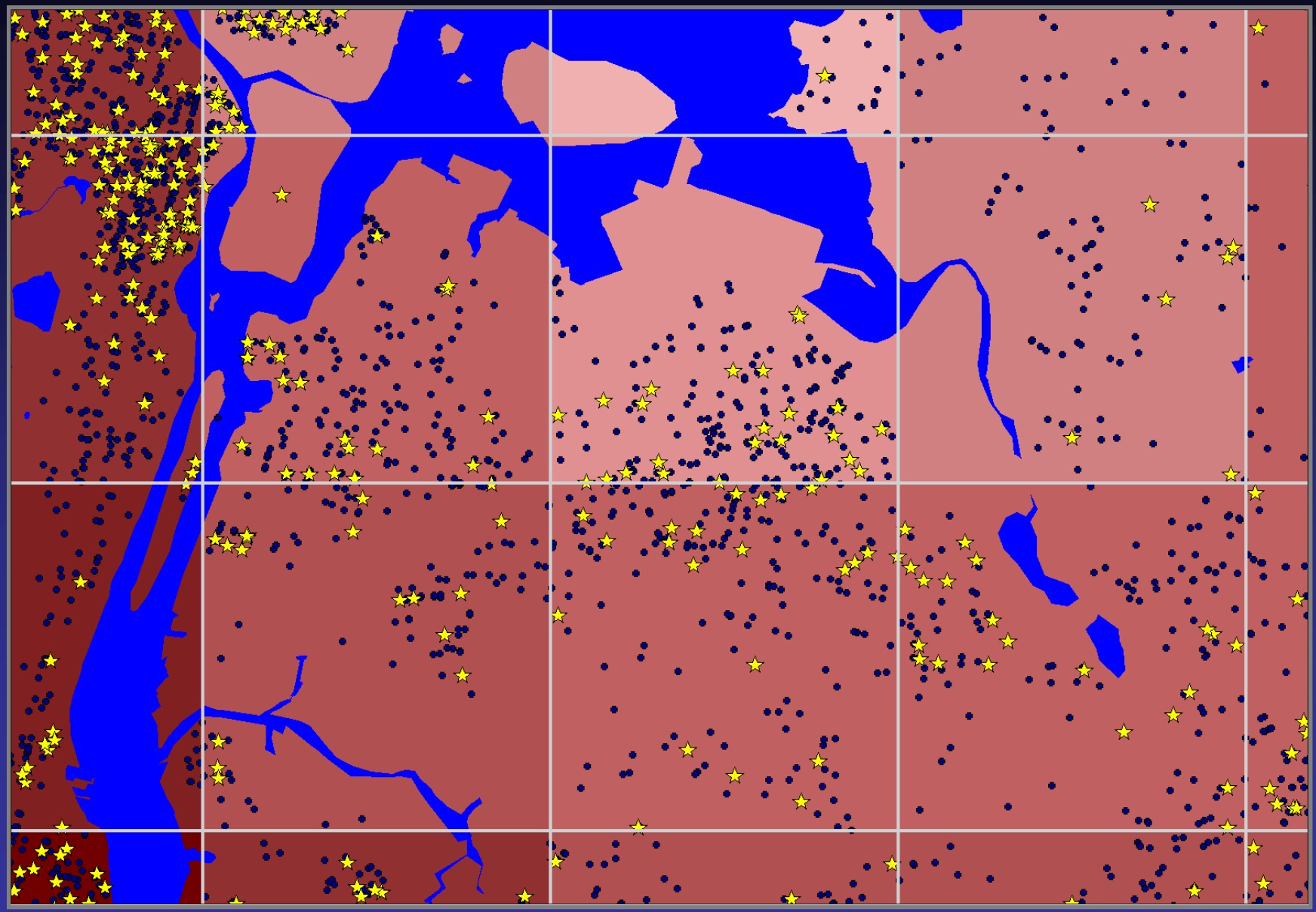
- Ungeocoded records assigned to exposure zones based on population distribution within each ZIP Code using Census Block Data

- Able to query, display and analyze the data using a Menu System Developed in MapInfo

- Developed MapInfo interface with SAS and other program such as SatScan.

Linking Health Data to Environmental Hazard Data

August 3



* August 3 Cases ● Air Pollution levels

Potential uses of the EPHT surveillance system

1. Respond to queries about environmental hazards & health outcomes
2. Identify unusual patterns and trends
3. Develop and evaluate public health interventions

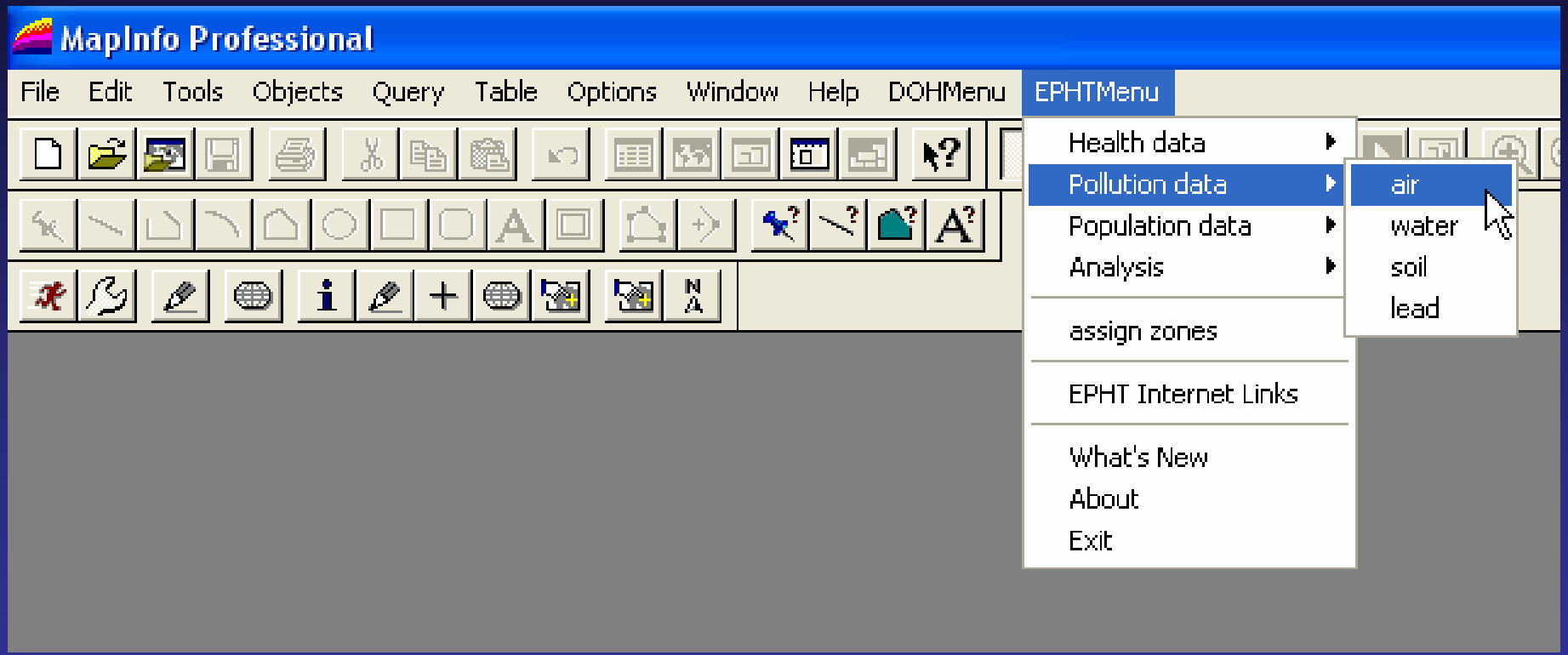
Some uses of the EPHT surveillance system

4. Provide simple measures of association

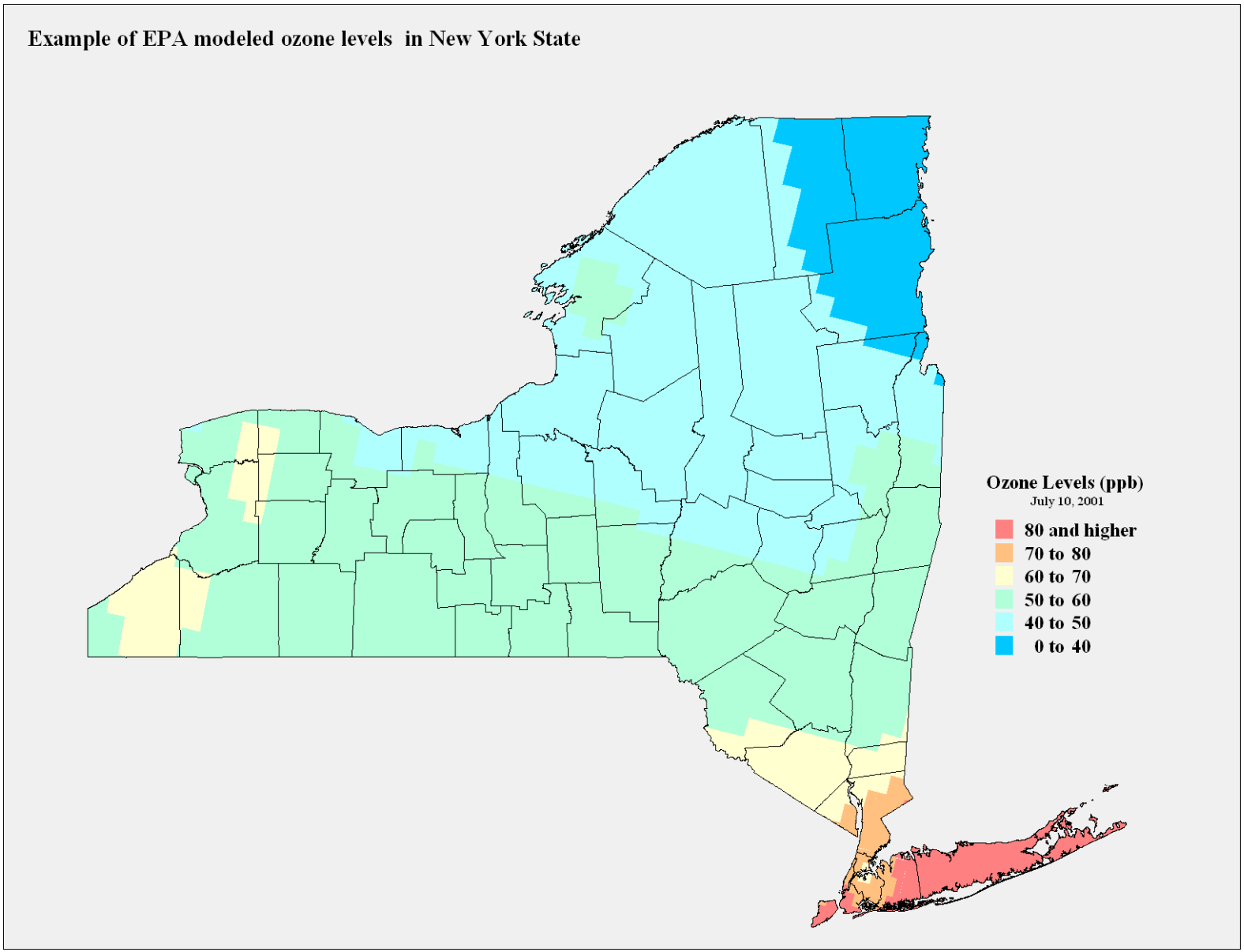
5. Facilitate research

4. Other uses …

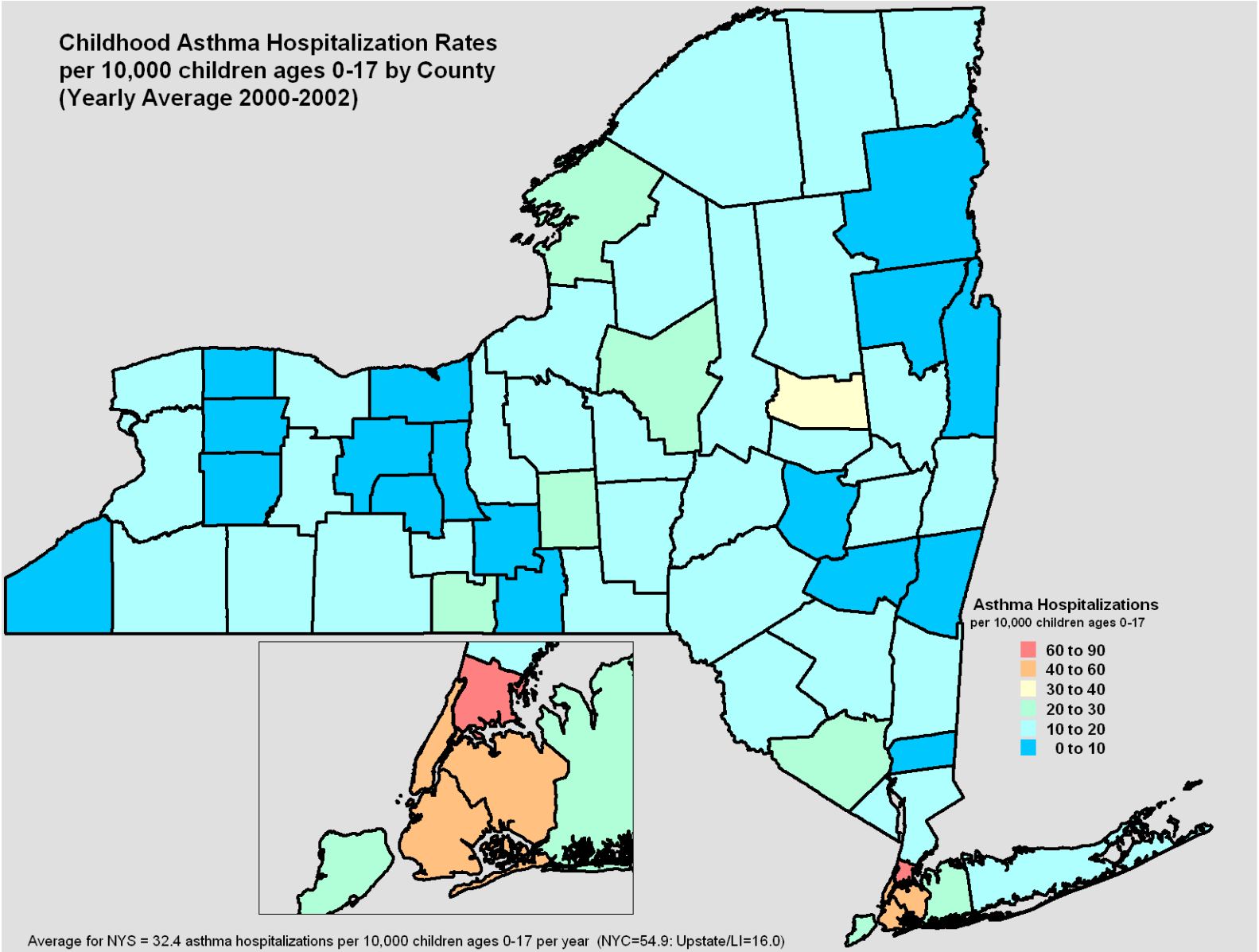
Functions of the EPHT Surveillance System



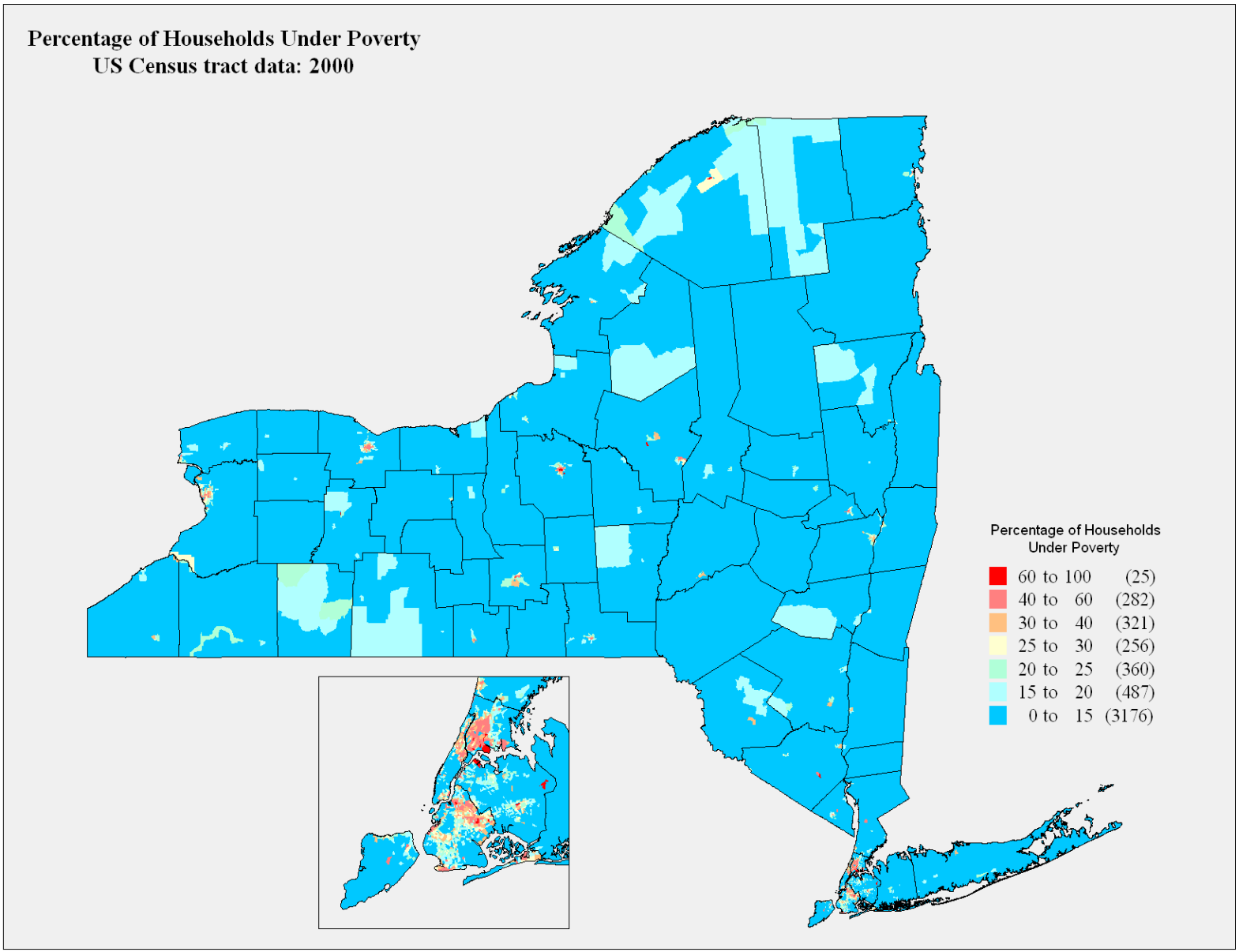
Questions about Hazards



Questions about Health Outcomes

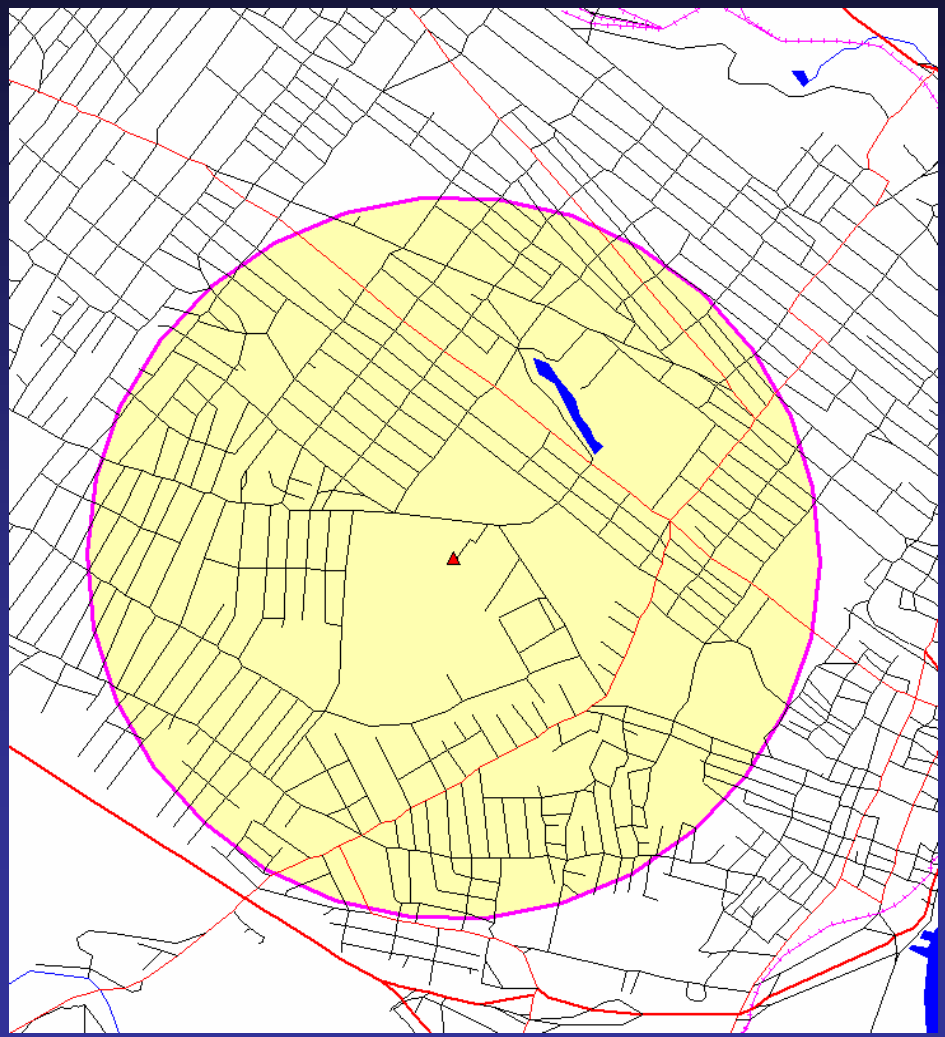


Other Factors Influencing Health



Population Demographics

within One Mile of a Site



Population	33,520
Female	51%
Male	49%
Age <6	6%
Age 6-19	16%
Age 20-64	68%
Age >64	11%
White	70%
Black	20%
Asian	4%
Native Americans	0%
Pacific Islanders	0%
Other race	2%
Multi-racial	3%
Hispanic	6%
Minority	32%
Nursing home residents	294
Under poverty level	23%
Median household income	$28,802

Identify unusual patterns

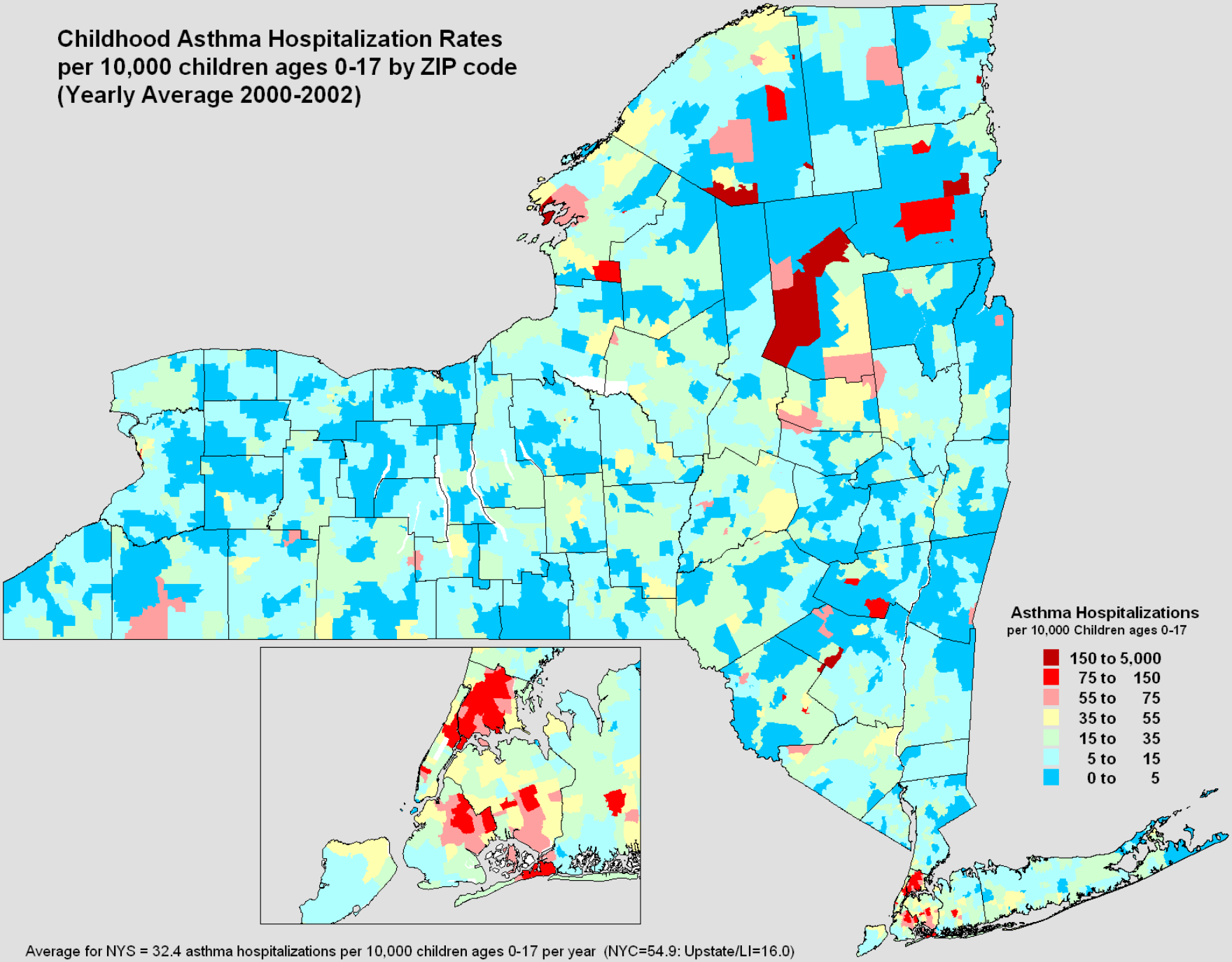
- How do rates of disease vary across the state?
- Is the disease clustered?
- Where are the most likely clusters?
- Could these high rates be due to chance?

Mapping Rates of Disease

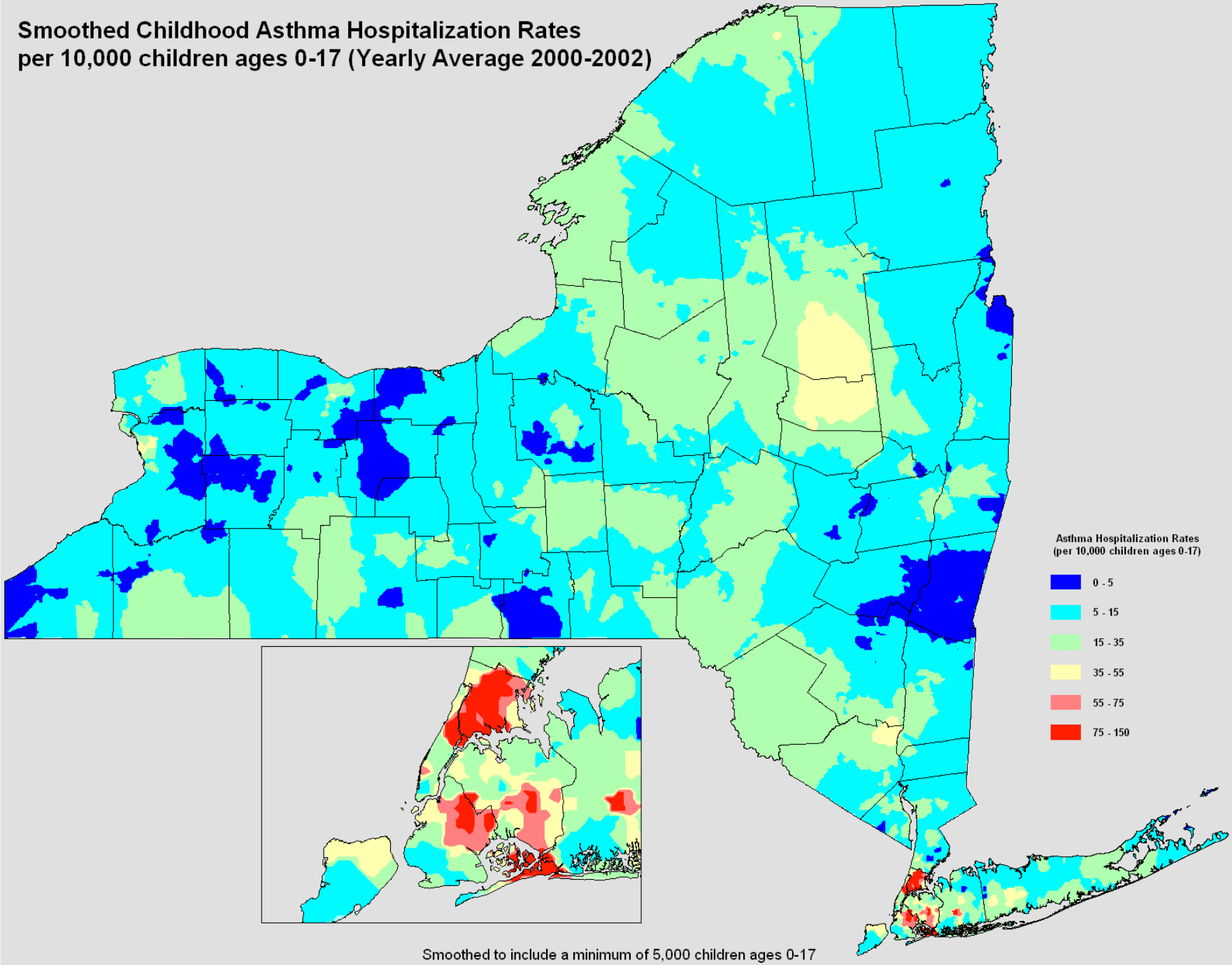
- Rates vary widely due to chance due to small numbers
- Developed adaptive spatial filter program to smooth data.
  - Rates based on minimum population size.
  - Create Multi- resolution maps to understand how rates change at different scales.

Talbot, Kulldorff, Forand, Haley, Evaluation of spatial filters to create smooth rate maps. Statist Med. 2000: 19:2399-2408

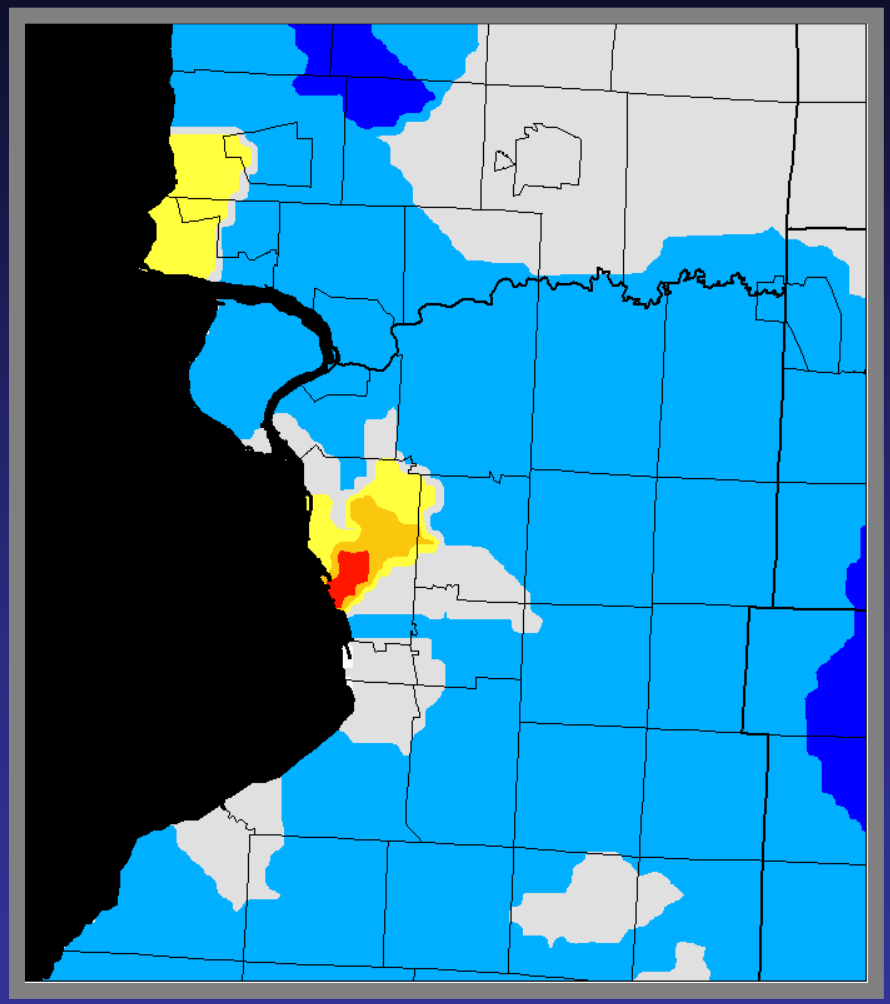
Childhood Asthma Hospitalization Rates per 10,000 children ages 0-17 by ZIP code (Yearly Average 2000-2002)



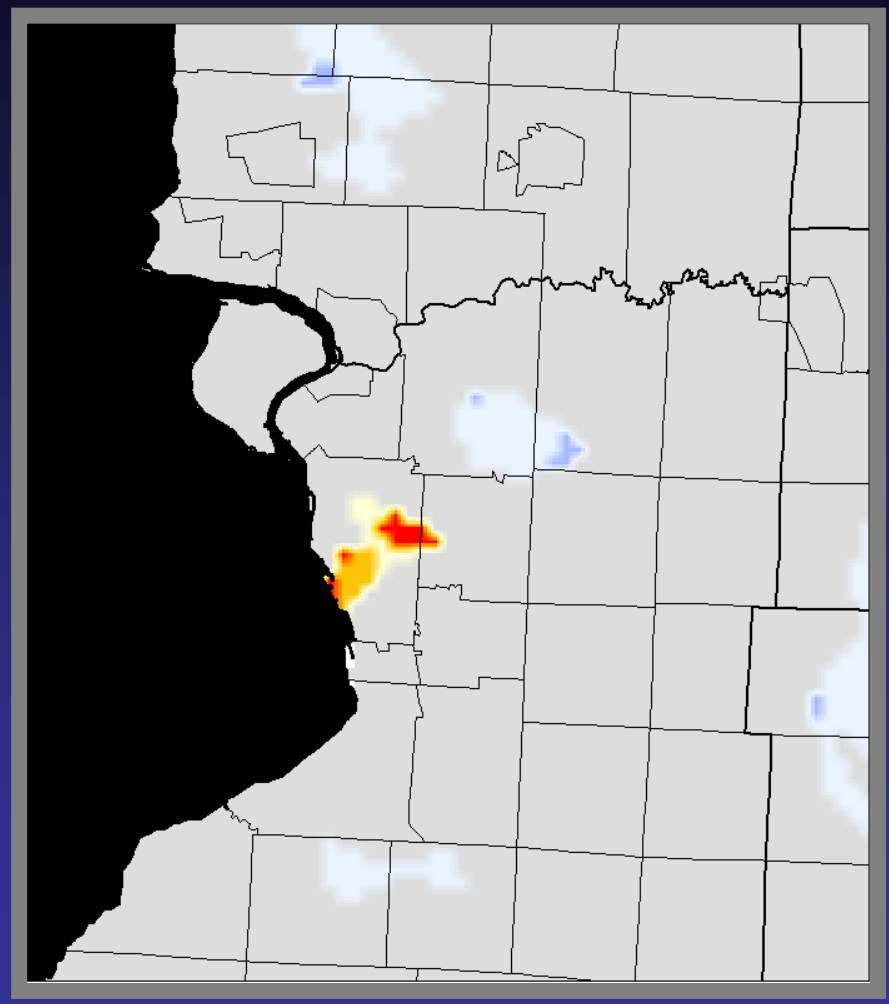
Average for NYS = 32.4 asthma hospitalizations per 10,000 children ages 0-17 per year (NYC=54.9: Upstate/LI=16.0)


Smoothed Childhood Asthma Hospitalization Rates
per 10,000 children ages 0-17 (Yearly Average 2000-2002)
Asthma Hospitalization Rates
(per 10,000 children ages 0-17)
0 - 5
5 - 15
15 - 35
35 - 55
55 - 75
75 - 150
Smoothed to include a minimum of 5,000 children ages 0-17

Resolution Threshold = 250 Births



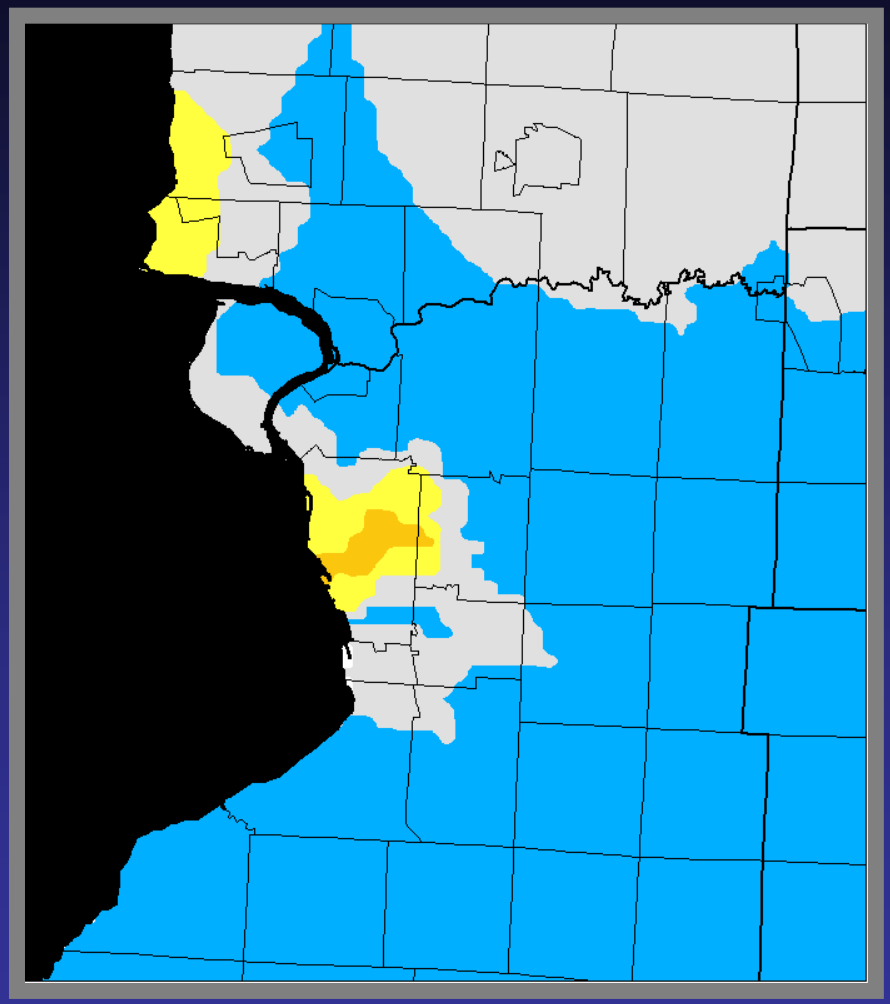
Low Birth Weight Rate



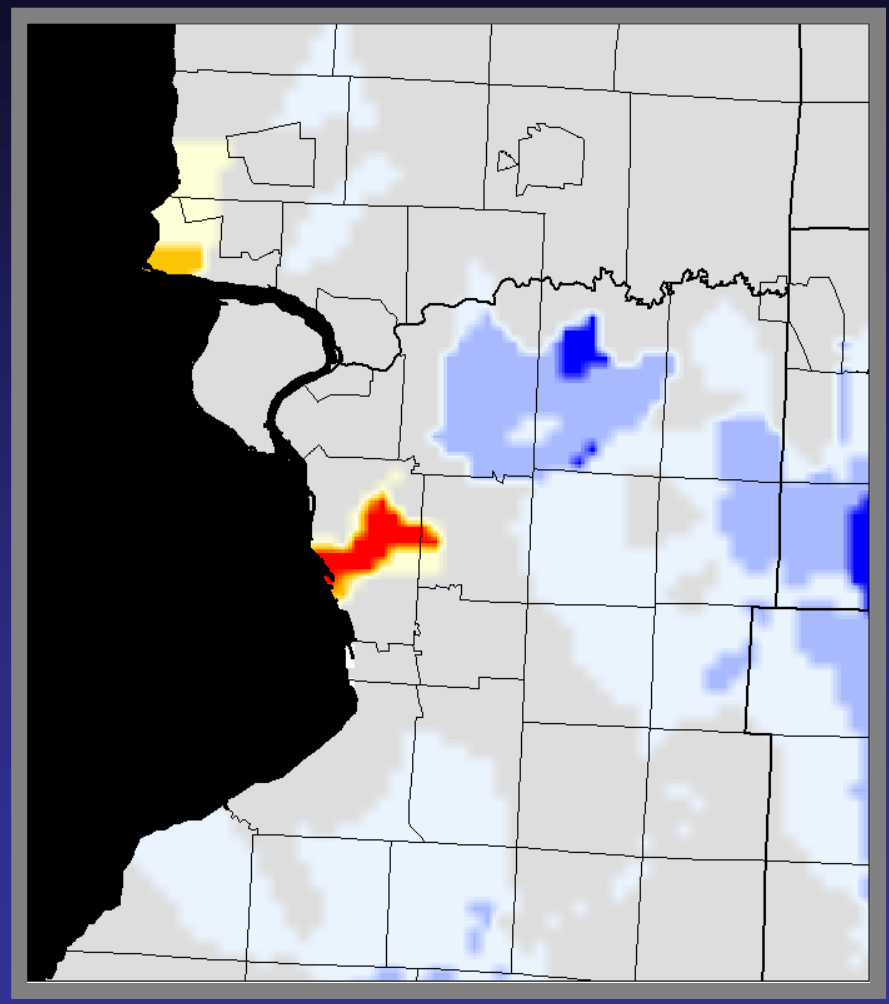
P Value

High & Low Risk

Resolution Threshold = 1,000 Births



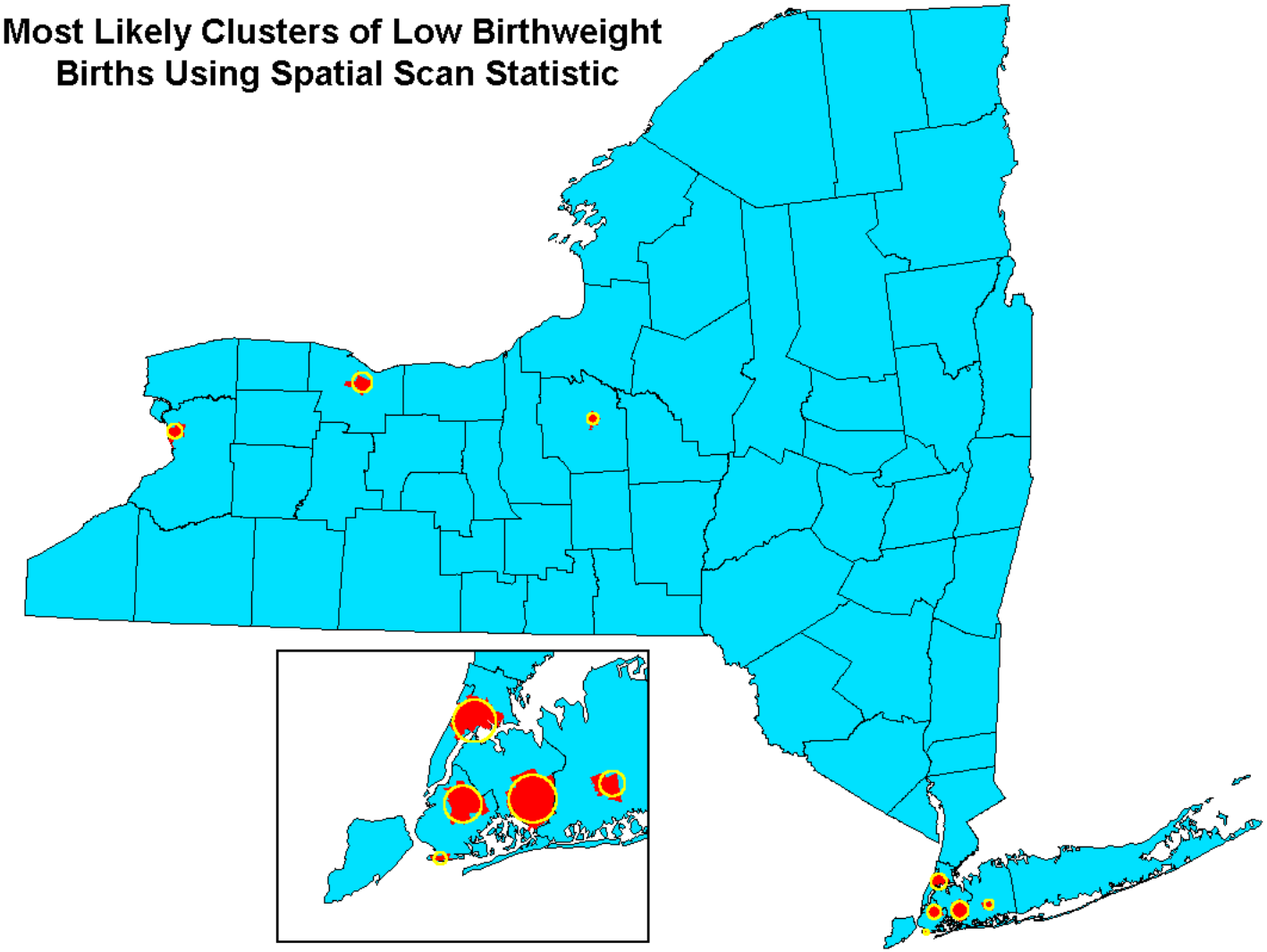
Low Birth Weight Rate



P Value

High & Low Risk

Most Likely Clusters of Low Birthweight Births Using Spatial Scan Statistic



p<0.05 Restictions; no cluster can contain more than 10% of births.

Identify Trends

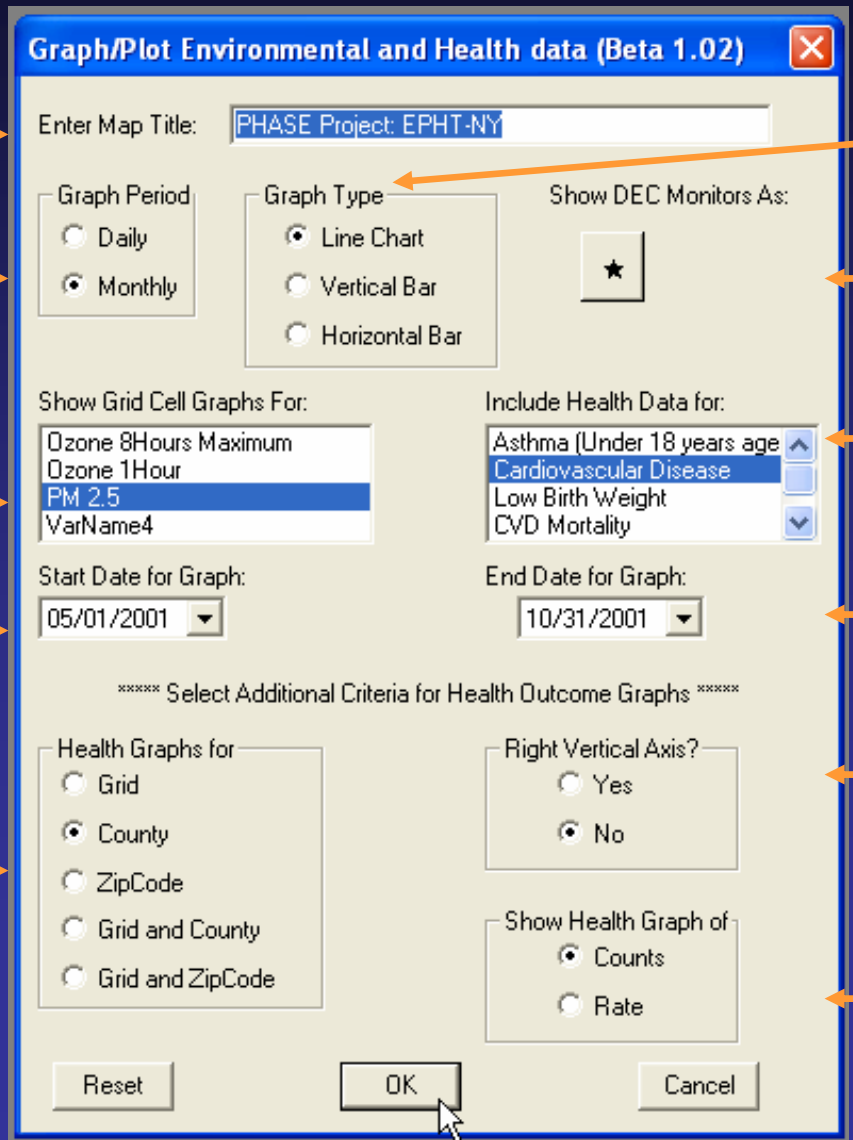
Enter Title for Layout

Select either Daily or Monthly

Select pollutant

Select Start date

Select Geographical unit for Health Graphs



Select type of graph

Select symbol

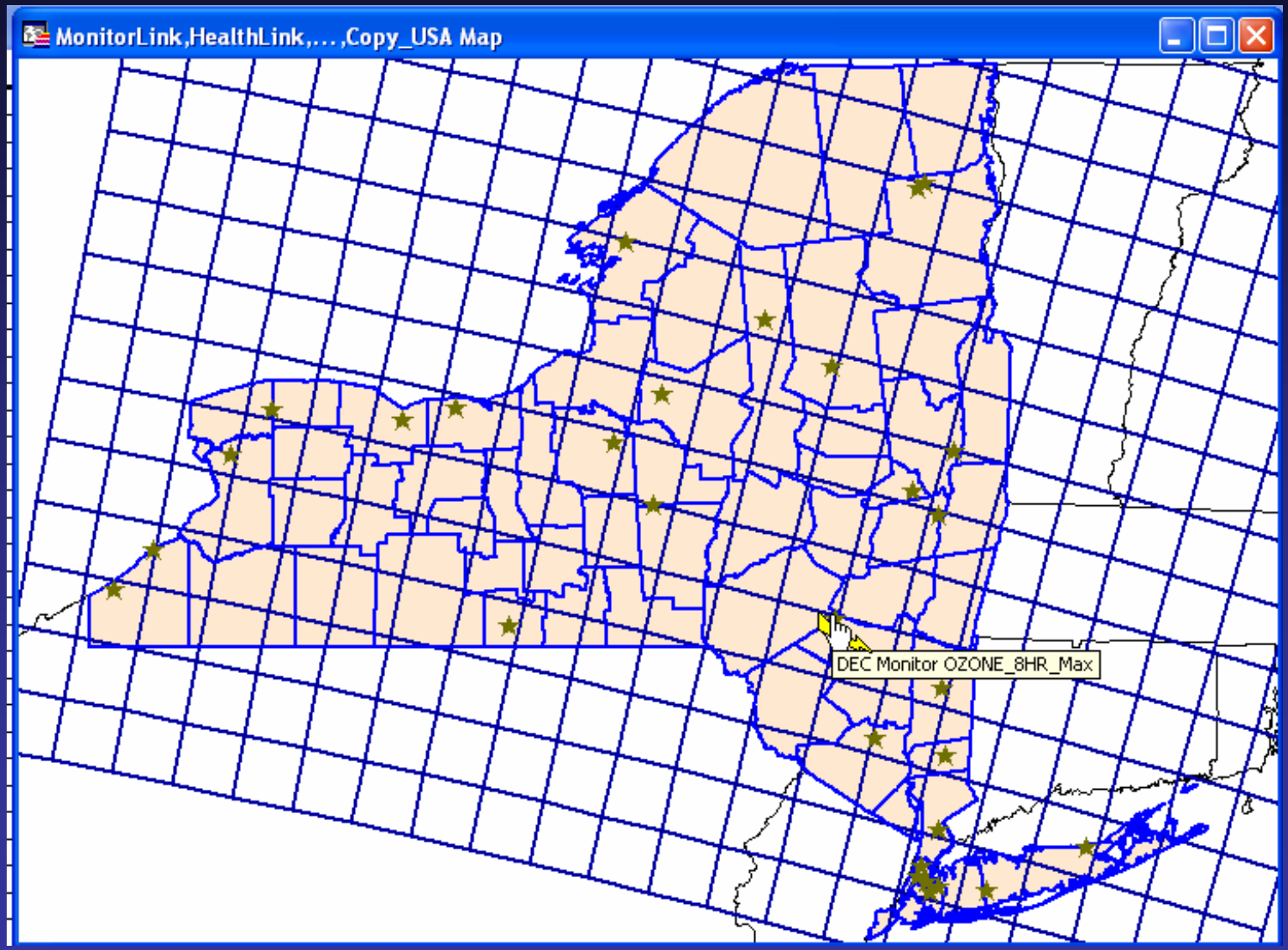
Select health outcome

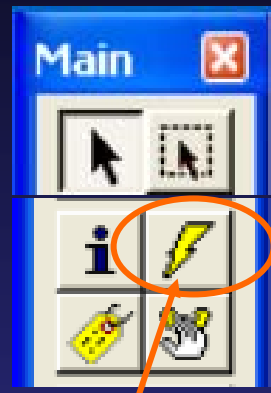
Select End Date

Select yes for both, health and air data, on one graph

Select either counts or rates

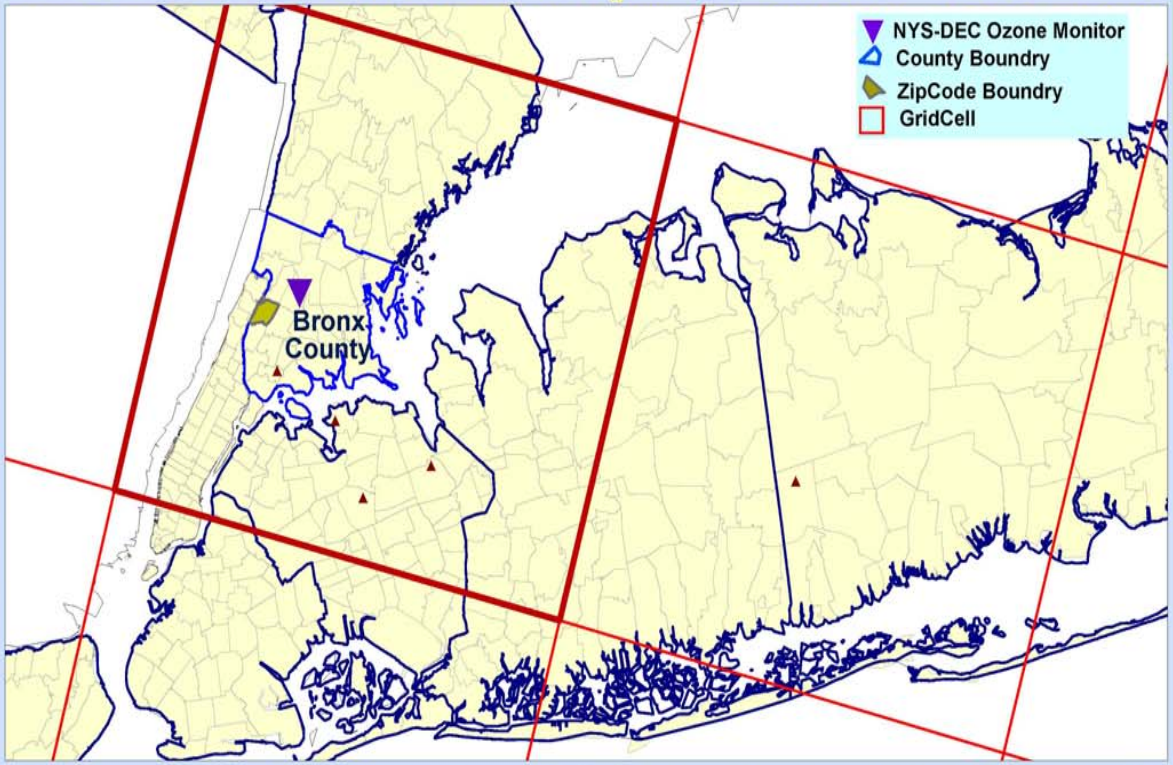
Point & Click to Produce Trend Charts



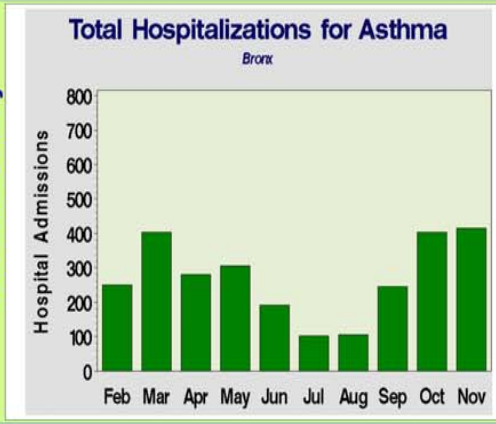


Click on HotLink tool to activate links to graphs

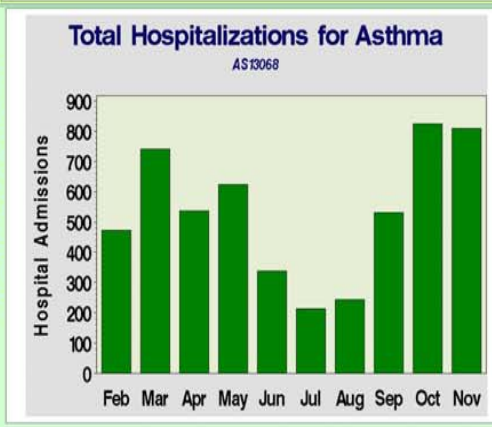
Ozone and Asthma Hospitalization: Year 2001



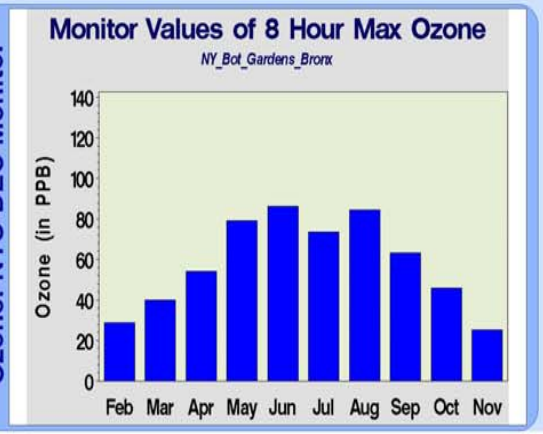
Asthma: County



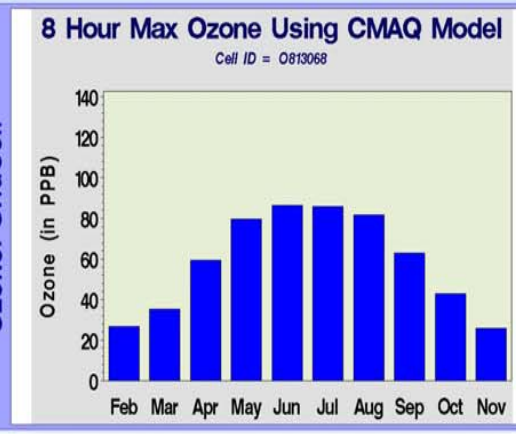
Asthma: Grid Cell



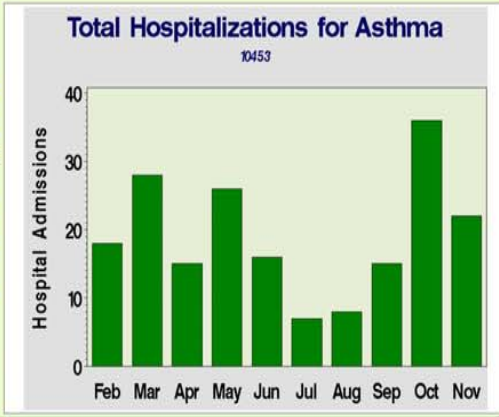
Ozone: NYS-DEC Monitor



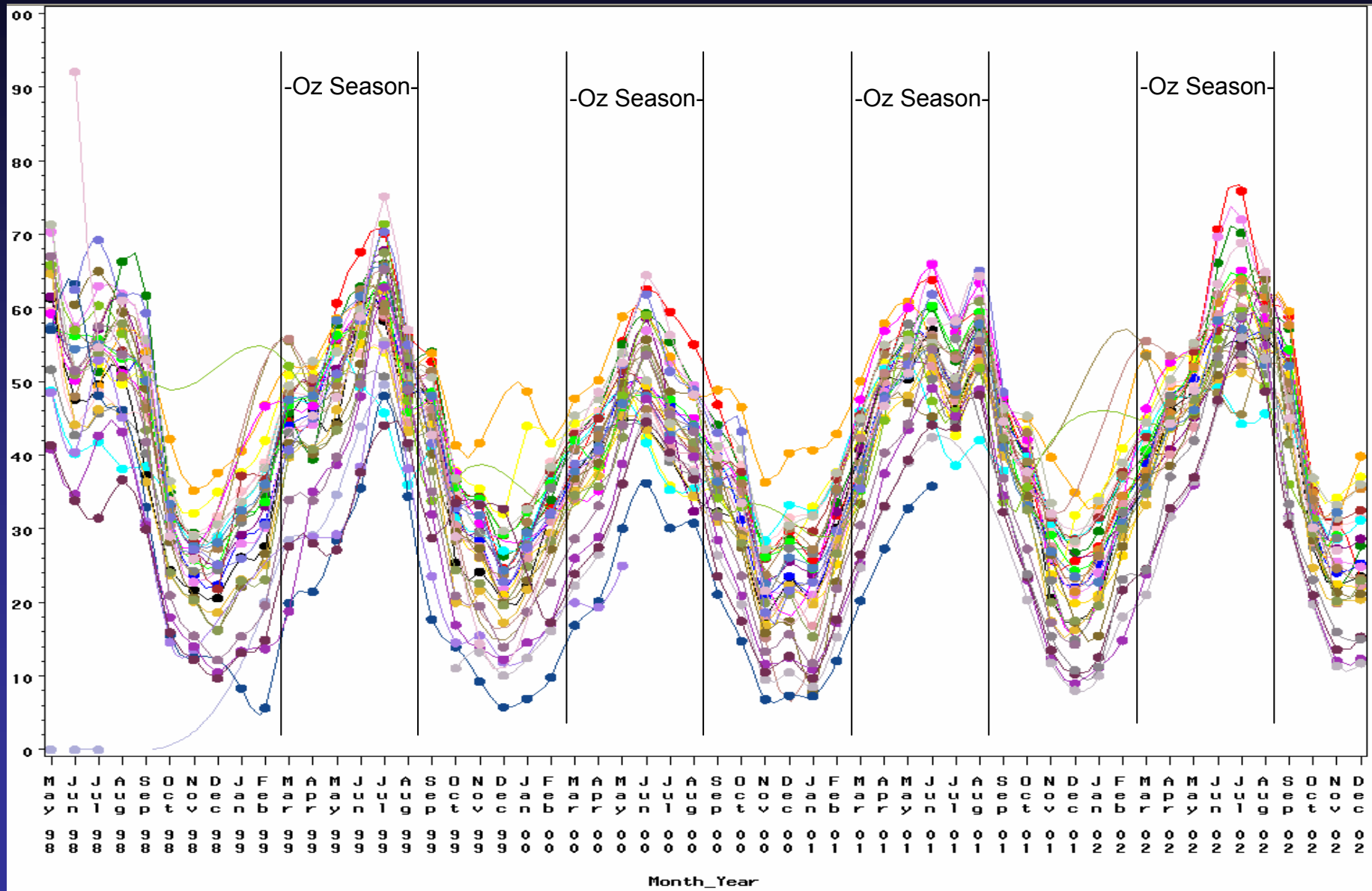
Ozone: GridCell



Asthma: ZipCode

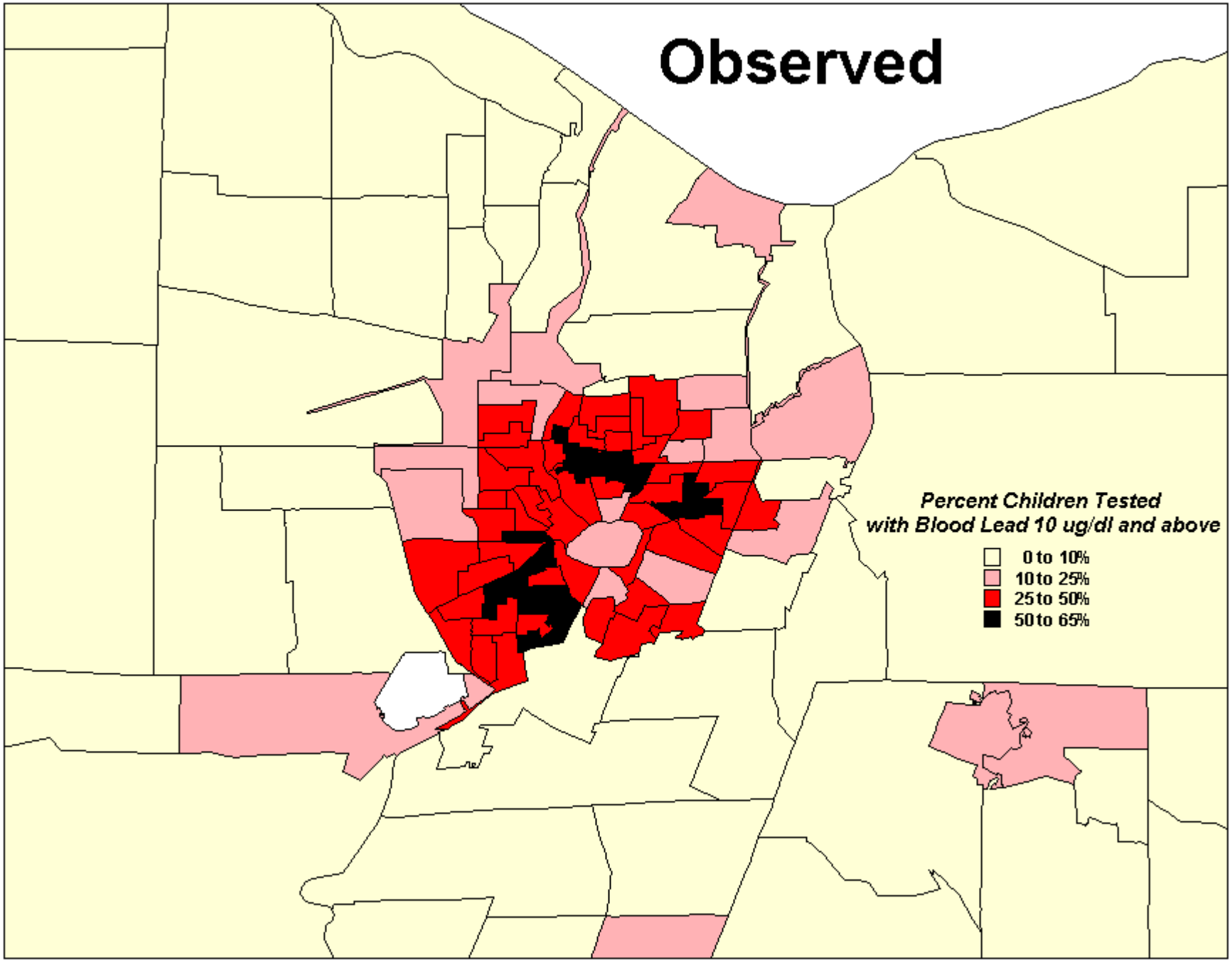


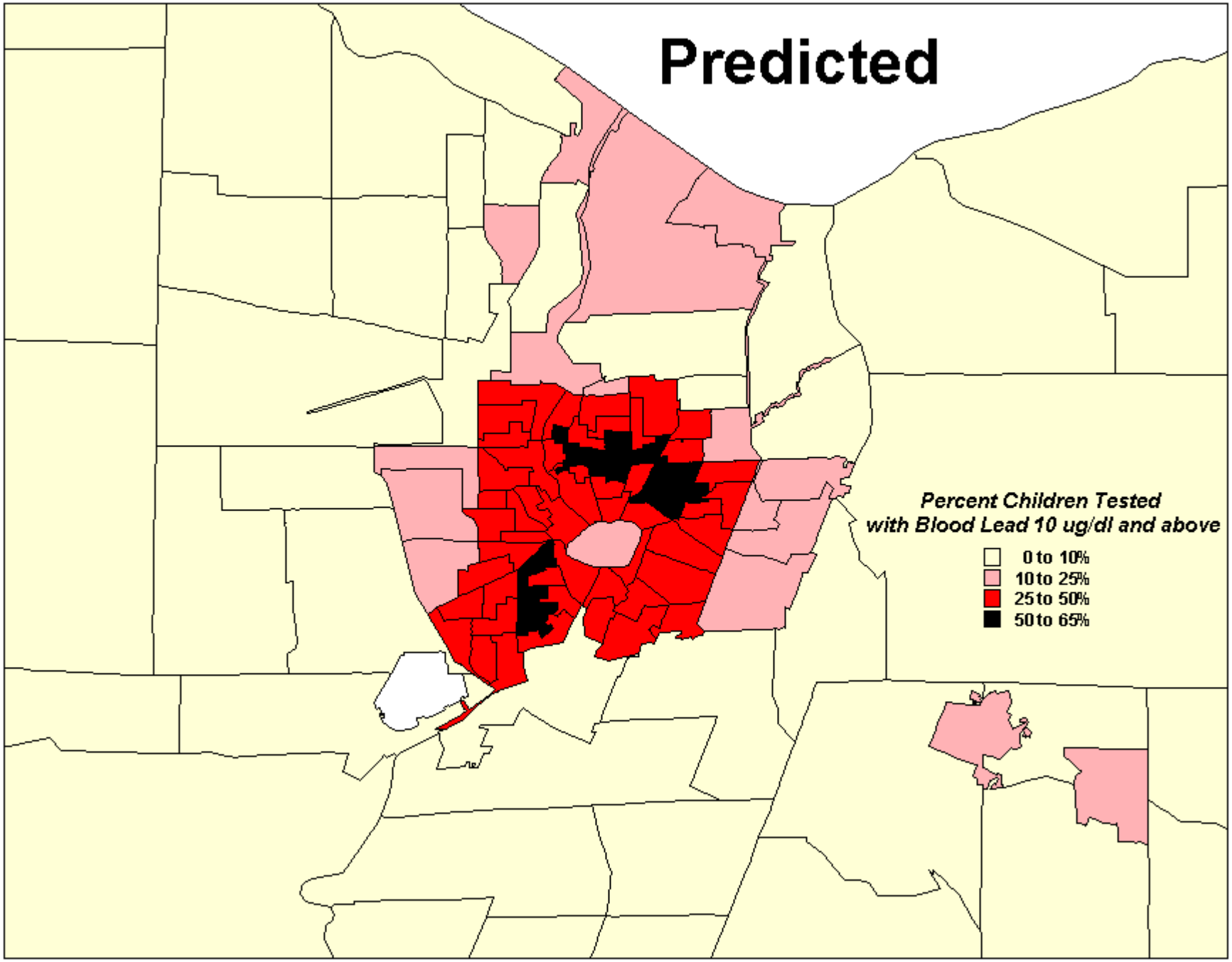
Average Daily 8 Hours Maximum Ozone in New York State By Monitoring Station (1998 to 2002)

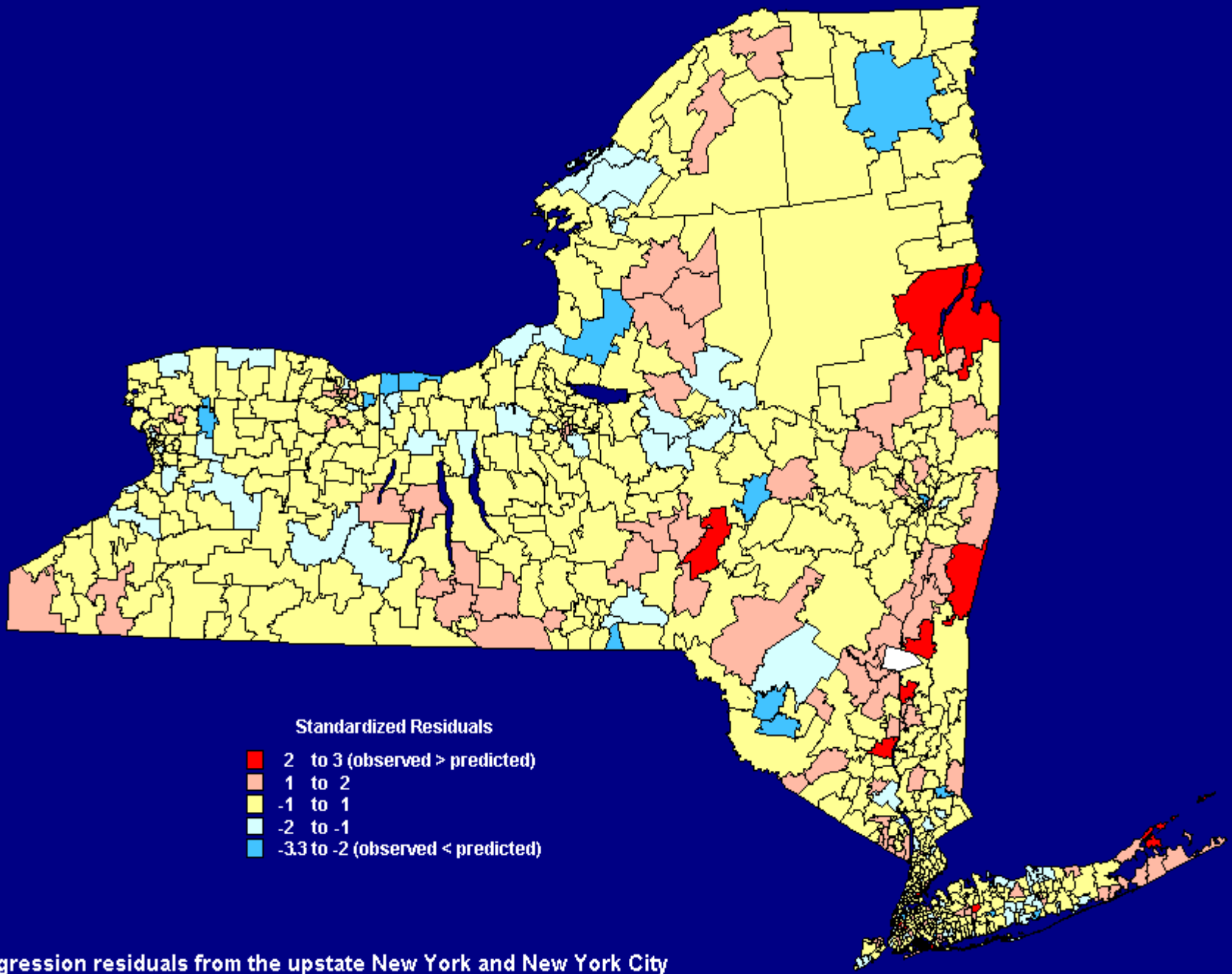


Measures of Association

- Regression Analyses
  - Multivariate Linear Regression
  - Simultaneous Auto Regressive Models
  - Case crossover Conditional Logistic Regression

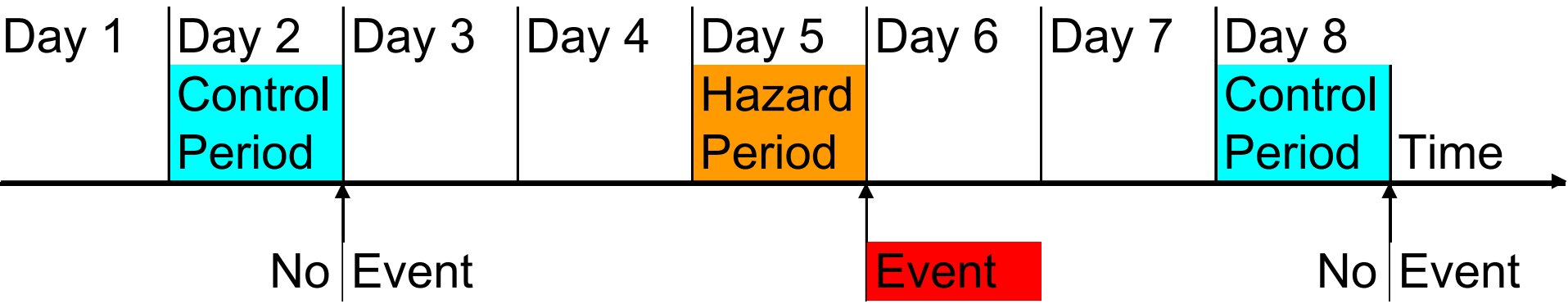

Observed
Percent Children Tested
with Blood Lead 10 ug/dl and above
0 to 10%
10 to 25%
25 to 50%
50 to 65%


Predicted
Percent Children Tested
with Blood Lead 10 ug/dl and above
0 to 10%
10 to 25%
25 to 50%
50 to 65%



Regression residuals from the upstate New York and New York City models. Areas represent ZIP code groups with a minimum of 100 children screened for blood lead.

Case-crossover Approach



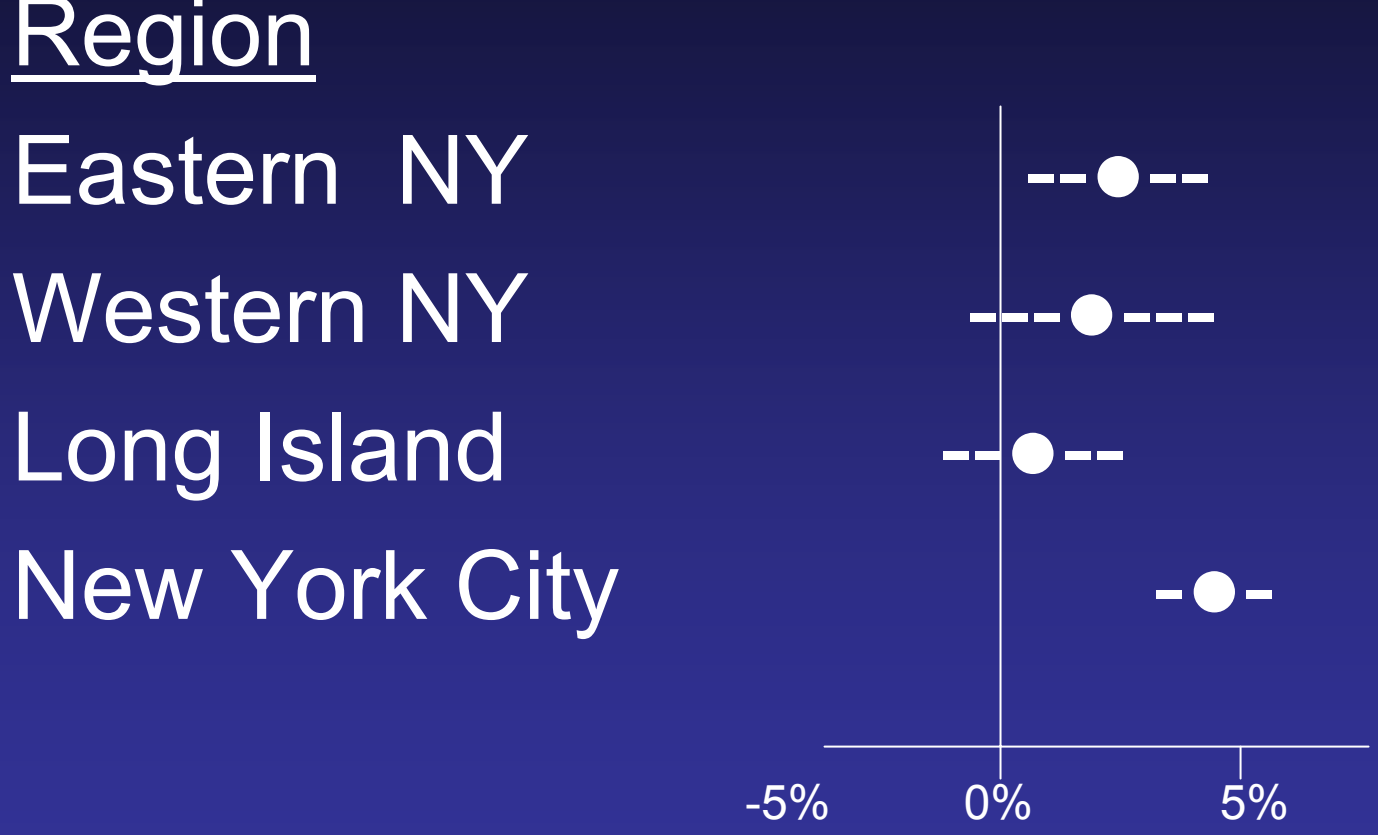
from Dr. Thomas Bateson

Hypothetical Changes in Asthma Hospitalization Rates in Relation to Air Pollutant Levels

Day of Exposure	% change in hosp.
Same day	+ 2%
Previous day	+4%
2 days before	+1%
3 days before	0%
Average of past 2 days	+3%

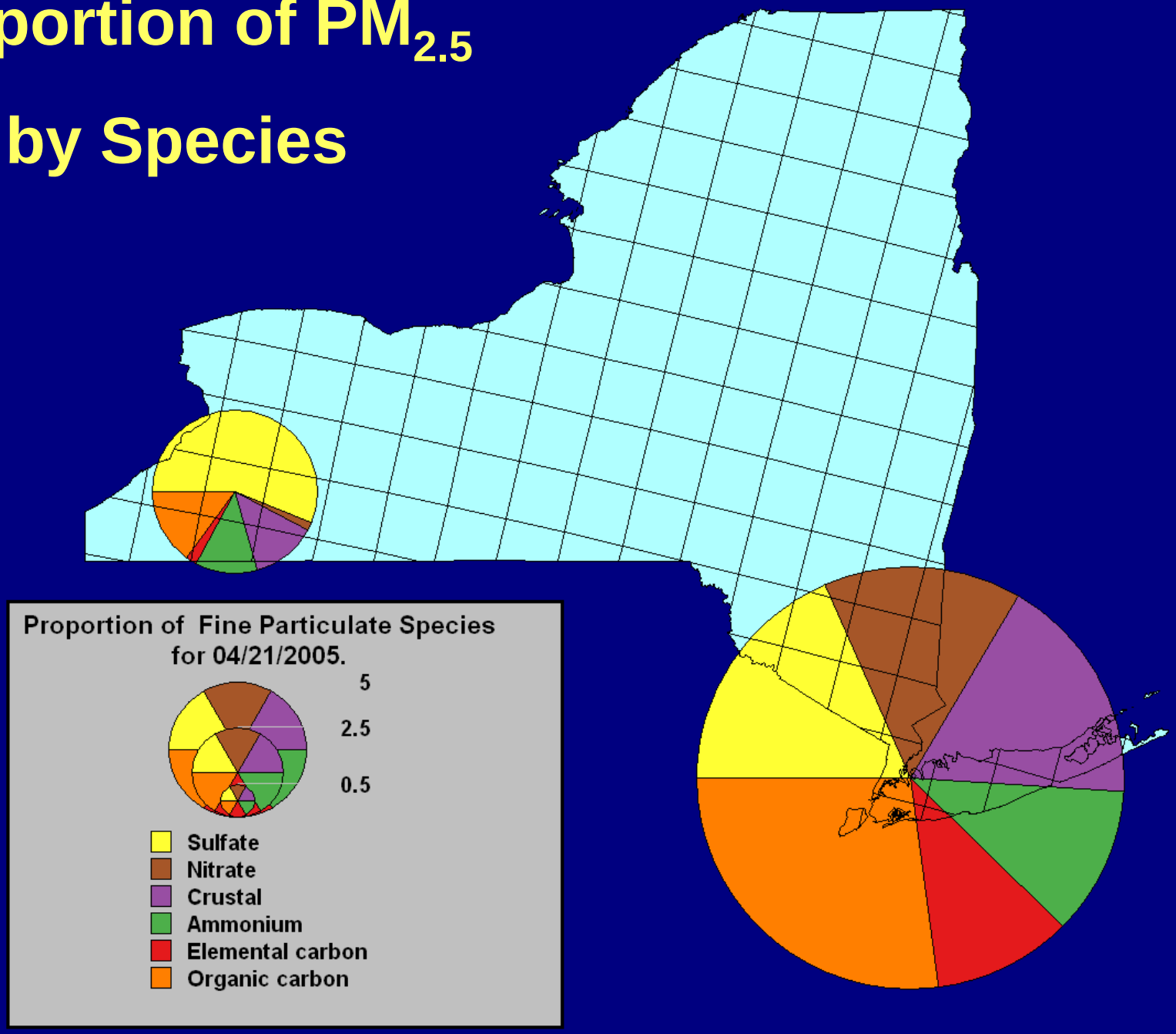
Percent increase per 10 ug/m^3 $PM_{2.5}$

Hypothetical Changes in Asthma Hospitalization Rates in Relation to Air Pollutant Levels, by Region

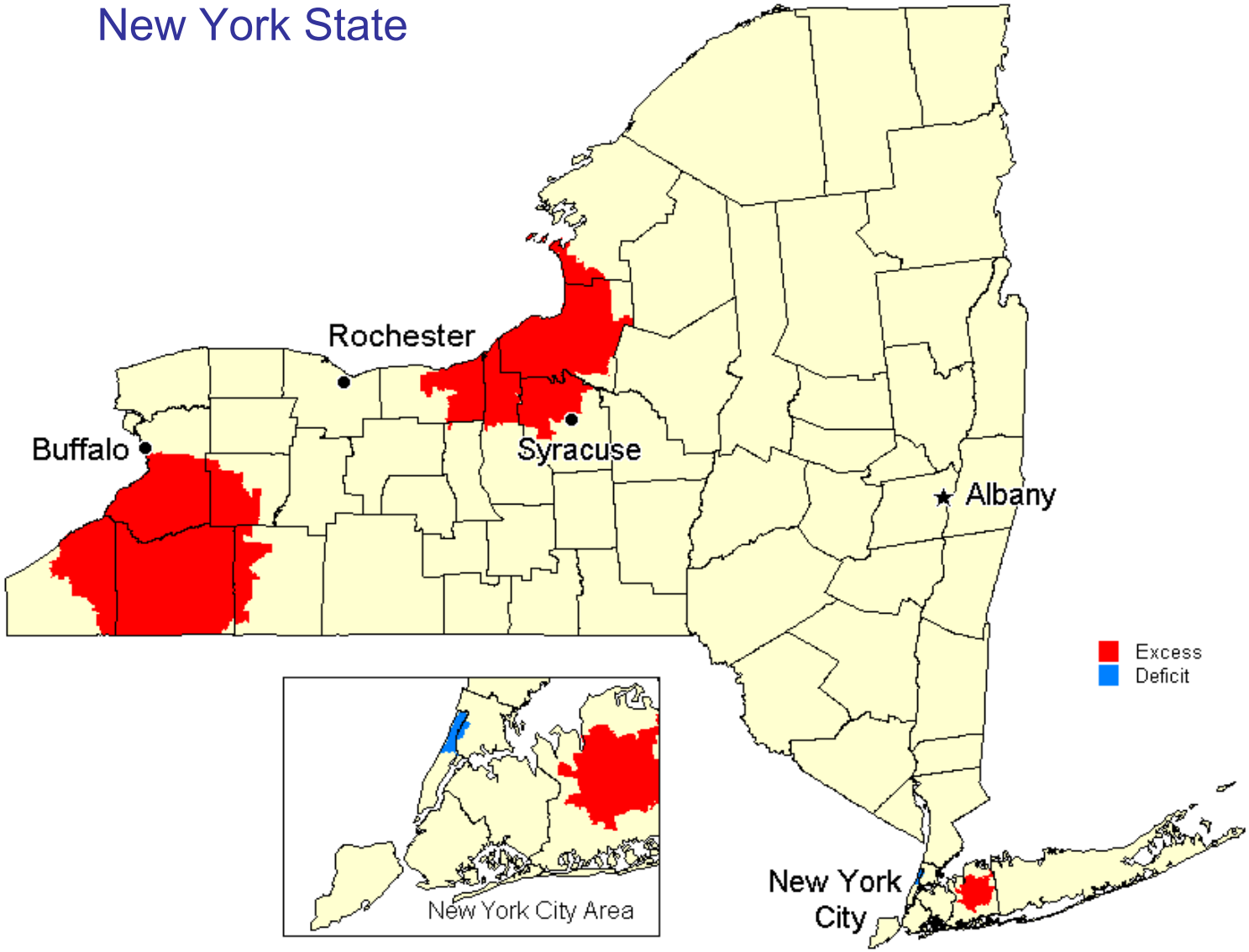


% change and 95% confidence interval per 10 ug/m^3 $PM_{2.5}$

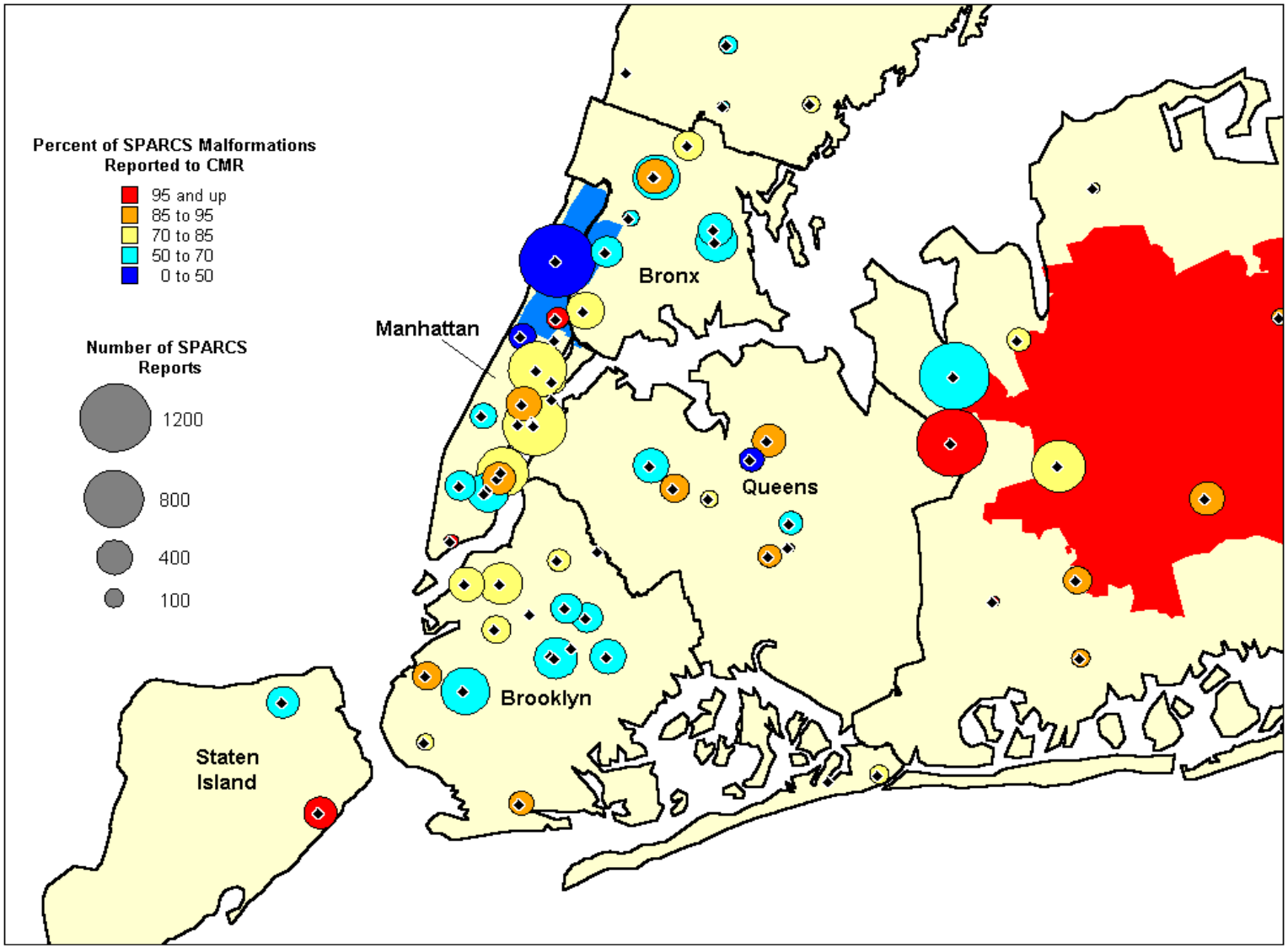
Proportion of $PM_{2.5}$ by Species



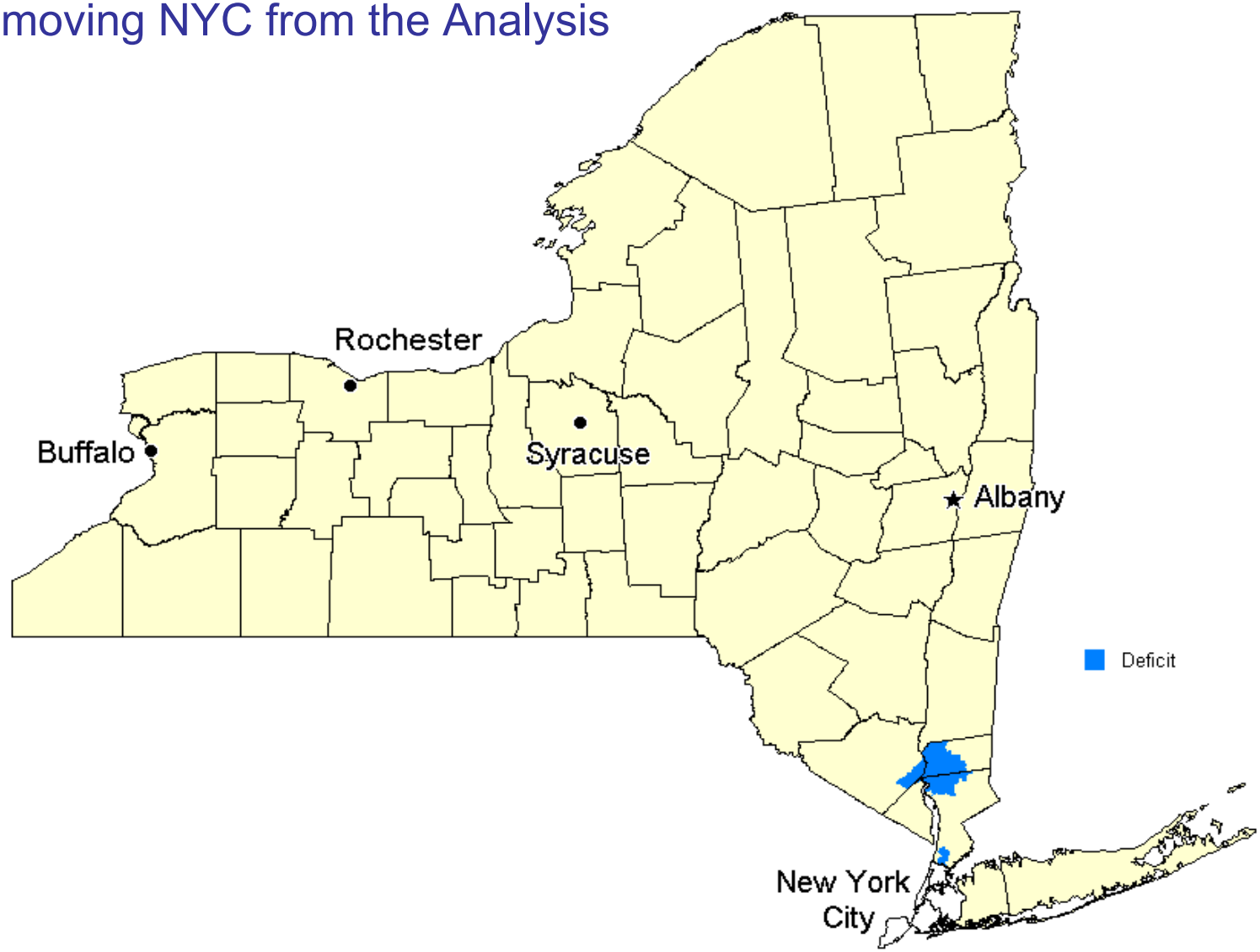
Most Likely Birth Defect Clusters
New York State



Hospital reporting rates. Hospitals with poor reporting by blue circles



Most likely Birth Defect Clusters after Removing NYC from the Analysis



The End